

1.

$$\int_0^1 \sqrt{x} / (x^2 + 1) dx$$

$$\int_0^1 x^{5/2} + x^{1/2} dx$$

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7.

$$\frac{dy}{dx} \quad 2xy^2 + 3 \ln y = x^2 - 3y^3$$

at (3,1)

$$2x \cdot 2y y' + y^2 \cdot 2 + 3 \frac{1}{y} y' = 2x - 9y^2 y'$$

$$4xy y' + \frac{3}{y} y' + 9y^2 y' = 2x - 2y^2$$

$$y' \left( 4xy + \frac{3}{y} + 9y^2 \right) = 2x - 2y^2$$

$$y' = \frac{2x - 2y^2}{4xy + \frac{3}{y} + 9y^2} \bigg|_{(3,1)} = \frac{6 - 2}{12 + 3 + 9}$$

$$= \frac{4}{24} = \frac{1}{6}$$

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$$8 \quad \int_1^{\infty} \frac{x^2}{(1+x^3)^2} dx \quad u = 1+x^3$$

$$\frac{du}{dx} = 3x^2$$

$$\int \frac{x^2}{u^2} \frac{du}{3x^2} \quad du = 3x^2 dx$$

$$\frac{1}{3} \int u^{-2} du \quad \frac{du}{3x^2} = dx$$

$$\frac{-1}{3u} \quad \lim_{b \rightarrow \infty} \frac{-1}{3(1+x^3)} \Big|_1^b =$$

$$\lim_{b \rightarrow \infty} \left[ \frac{-1}{3(1+b^3)} - \frac{-1}{3(1+1)} \right] = \frac{1}{6}$$

0

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10. ~~(5,2)~~  $y = h(x)$   
 eqn of tan line  
 need  $h'(5)$   
 from graph of  $h'$ :  $h'(5) = 1$   
 tan line:  $y = 1(x-5) + 2$

~~$y = 1(x-5) + 2$~~

$$y - y_1 = m(x - x_1)$$

$$y - 2 = 1(x - 5) \quad \checkmark$$

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13.  $a = 2t - 3$   $v_0 = -4$   
 $0 \leq t \leq 5$   
 farthest left  
 smallest  $x$  (min  $x$ )

$$v = \int 2t - 3 \, dt = t^2 - 3t + C = \frac{dx}{dt}$$

init cond:  $-4 = 0^2 - 3 \cdot 0 + C$   $C = -4$

$$\frac{dx}{dt} = t^2 - 3t - 4 = 0$$

$$(t-4)(t+1) = 0$$

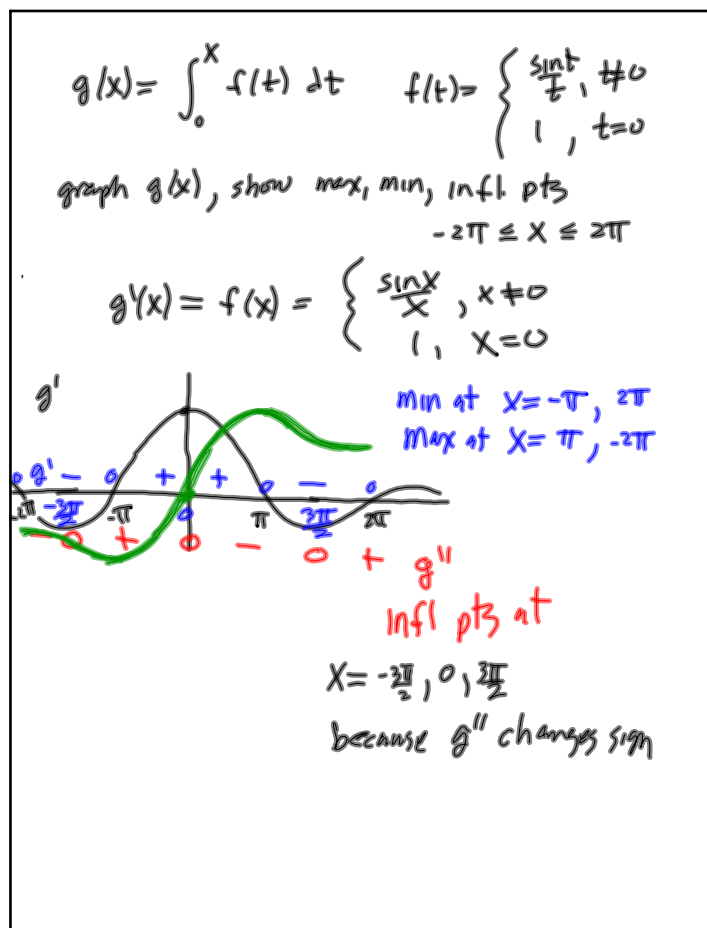
$$t = 4$$

$$x''(4) = a(4) = 2 \cdot 4 - 3 = 5 \quad \begin{pmatrix} ++ \\ \cup \end{pmatrix}$$

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Review 9  $f, f', f''$  $f''$ : concavity $f'' > 0$   $f$  concave up $f'' < 0$   $f$  concave downinflection pt:  $f''$  changes sign

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